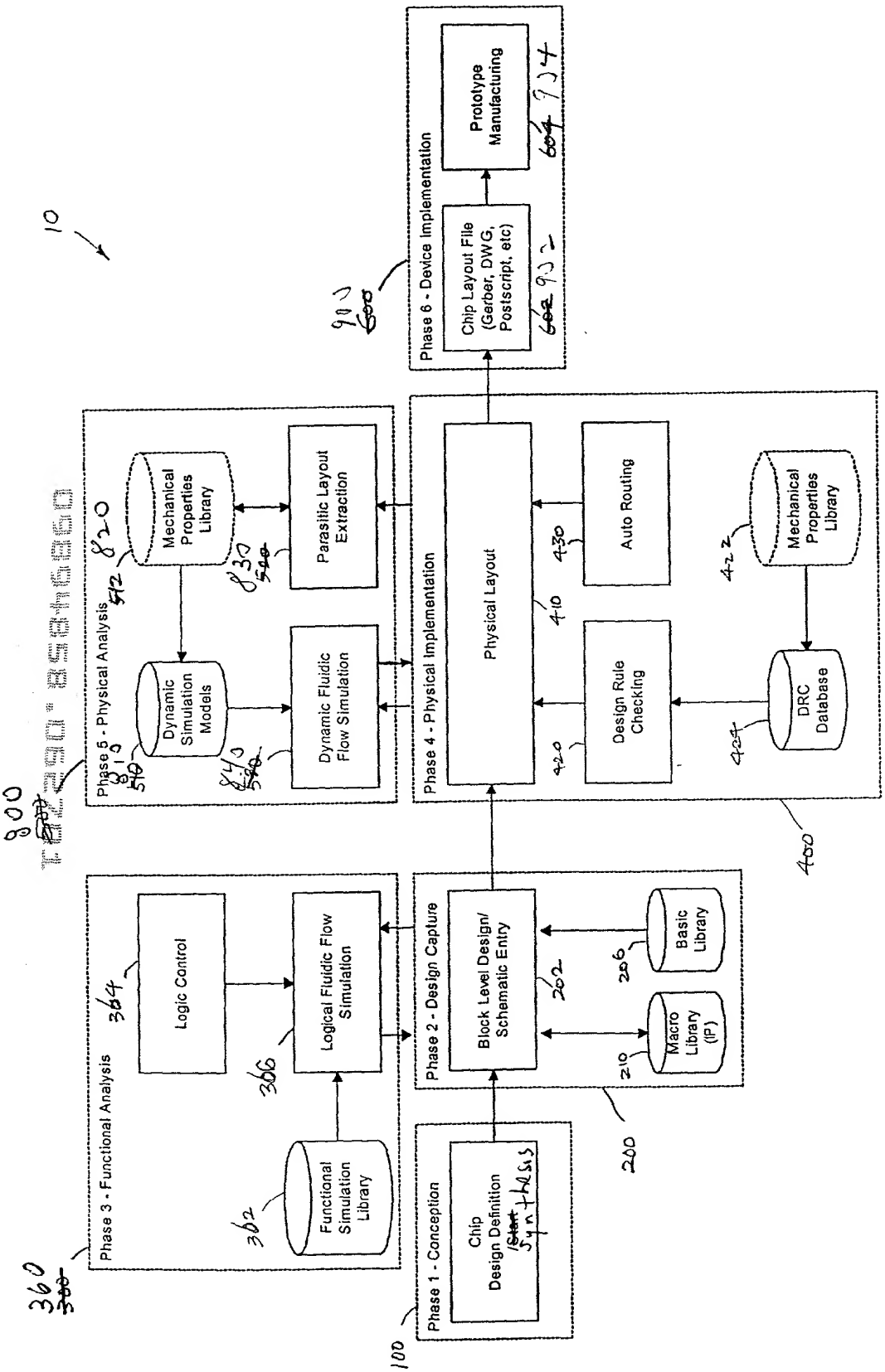

Phase 1 - Conception
Chip Design Definition
Phase 2 - Design Capture
Block Level Design/ Schematic Entry
Basic Library
Macro Library (IP)
Phase 3 - Functional Analysis
Logic Control
Logical Fluidic Flow Simulation
Functional Simulation Library
Phase 4 - Physical Implementation
Physical Layout
Auto Routing
Design Rule Checking
DRC Database
Mechanical Properties Library
Phase 5 - Physical Analysis
Mechanical Properties Library
Parasitic Layout Extraction
Dynamic Simulation Models
Dynamic Fluidic Flow Simulation
Phase 6 - Device Implementation
Chip Layout File (Gerber, DWG, Postscript, etc)
Prototype Manufacturing

FIG. 1

20174-0068

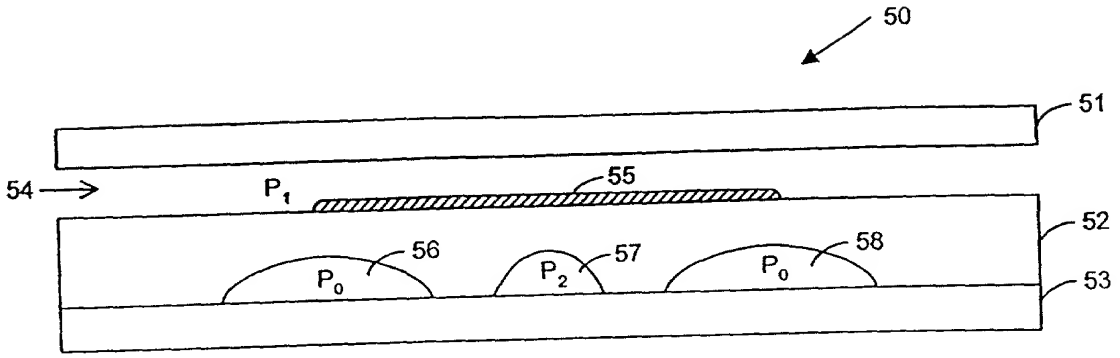


FIG. ~~5A~~ 2A

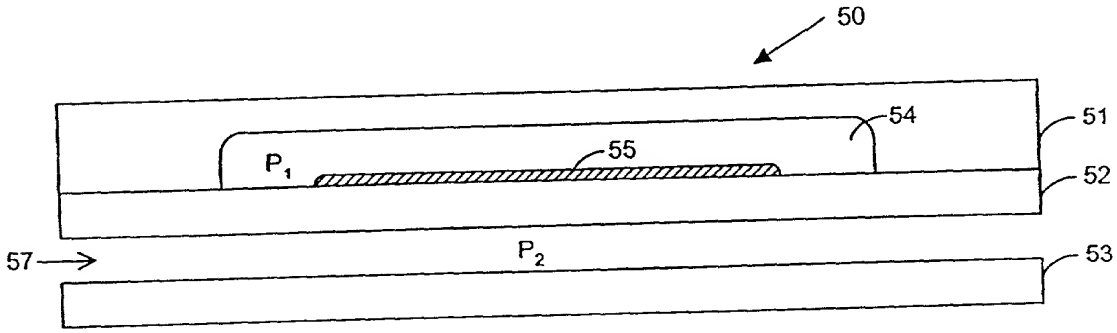


FIG. ~~5B~~ 2B

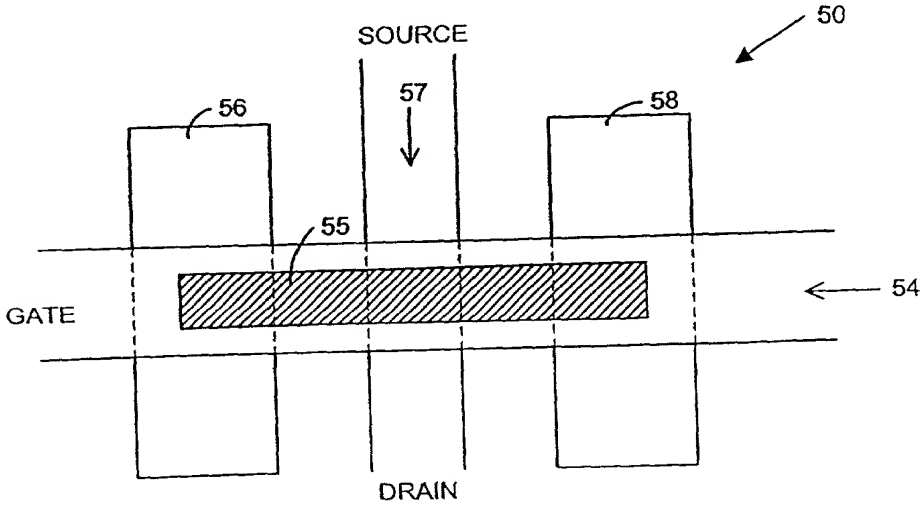


FIG. ~~6~~ 3

FIG. 1A

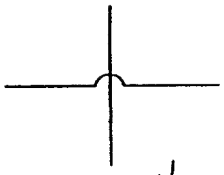


FIG. 1G

FIG. 1B

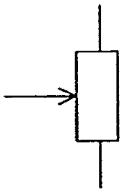


FIG. 1H

FIG. 1C

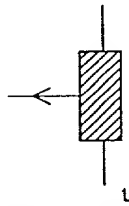


FIG. 1I

FIG. 1D

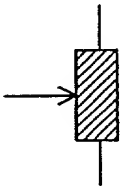


FIG. 1J

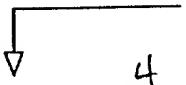


FIG. 1E

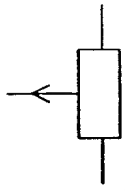


FIG. 1K

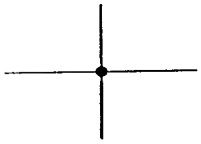


FIG. 1F

USSN 10/[illegible]

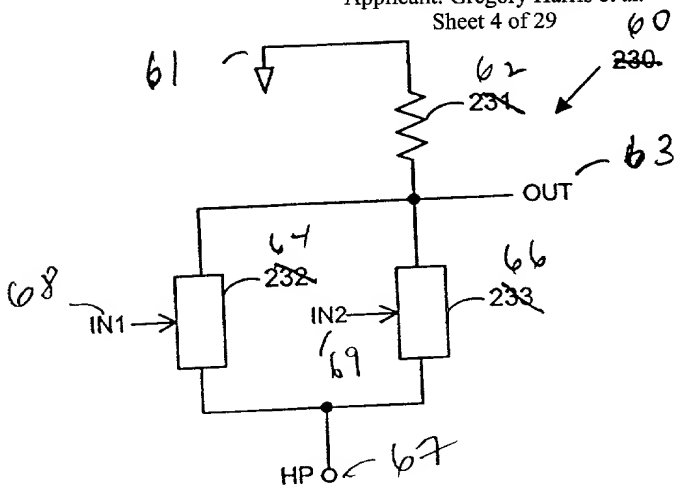


FIG. ~~12A~~ 5A

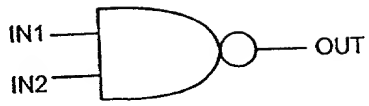


FIG. ~~12B~~ 5B

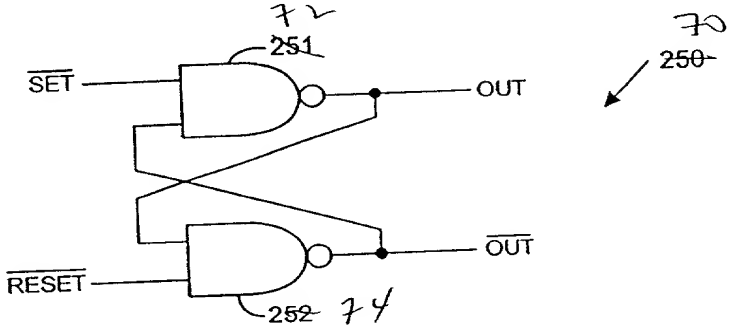


FIG. ~~13~~ Fig 6A

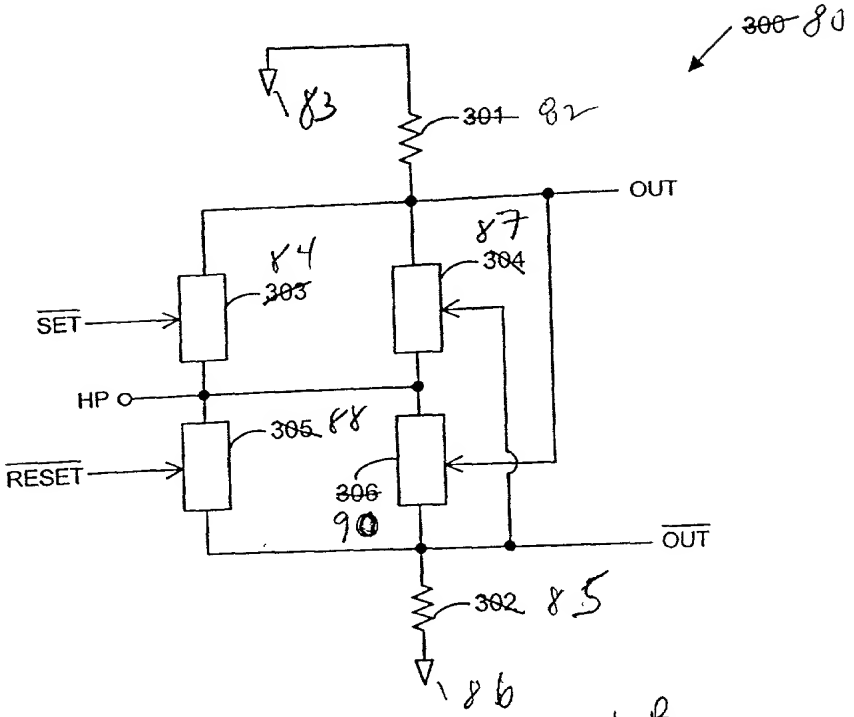


FIG. 14A Fig 6B

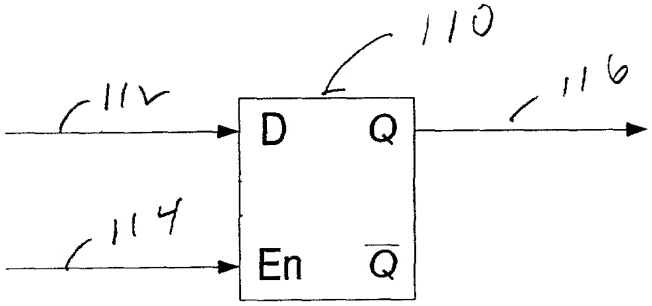


Fig 7A

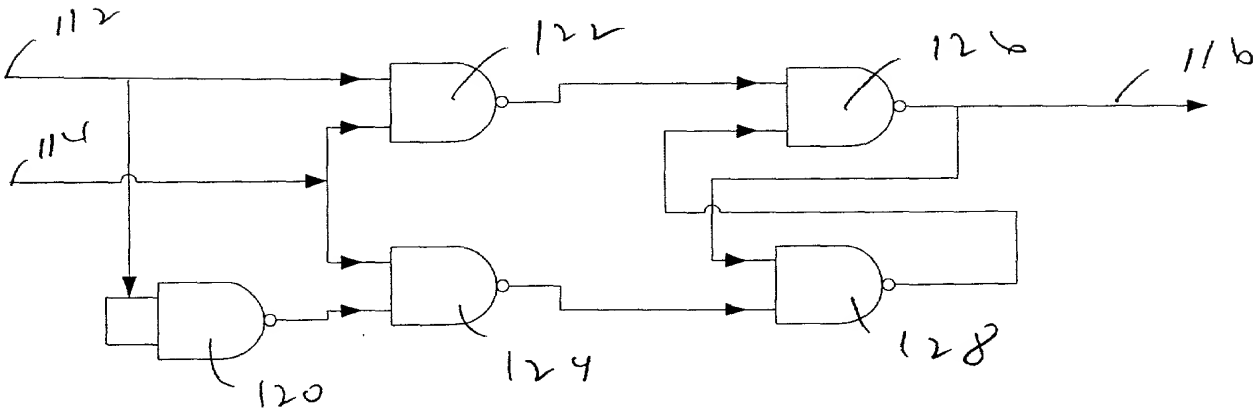


Fig 7B

Petitioner Ex. 1005 - Page 0006

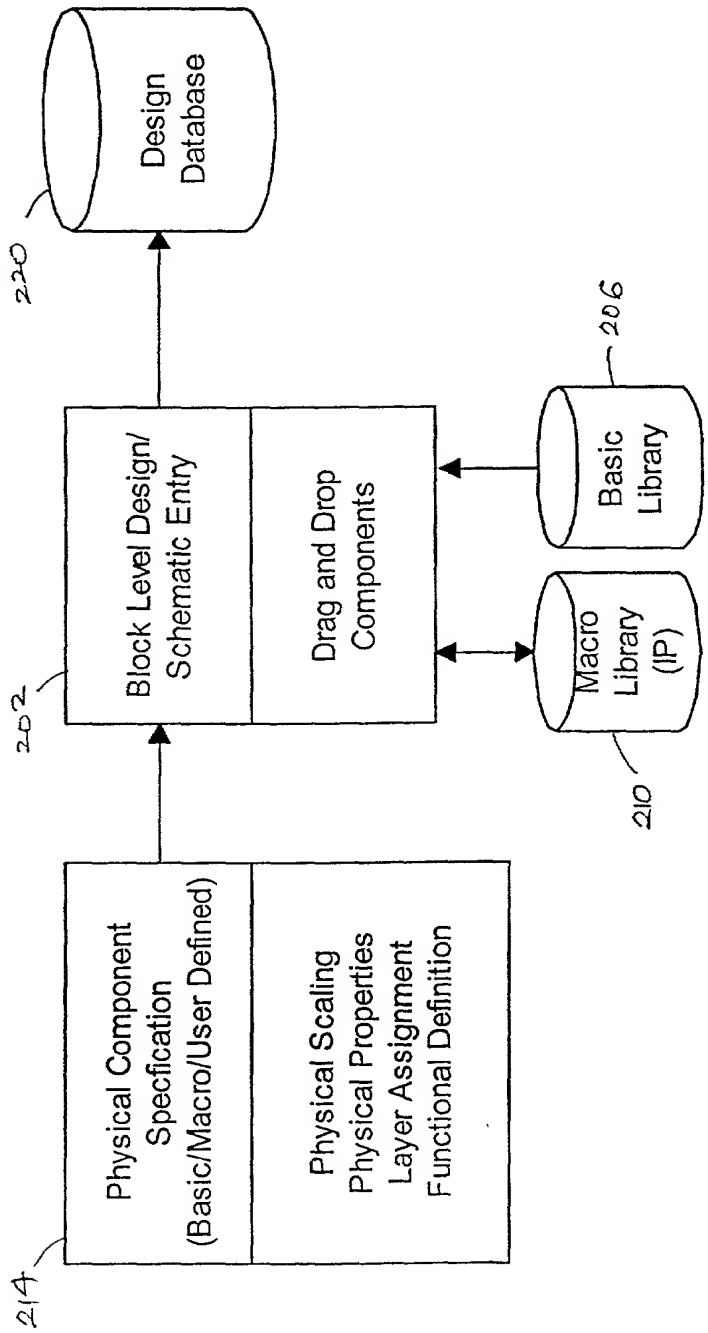

Design Database
220
Block Level Design/ Schematic Entry
Drag and Drop Components
202
Basic Library
206
Macro Library (IP)
210
Physical Component Specfication (Basic/Macro/User Defined)
Physical Scaling Physical Properties Layer Assignment Functional Definition
214
200

FIG. 2

Express Mail Label No. EV 339 888 425 US

On-Off Valve

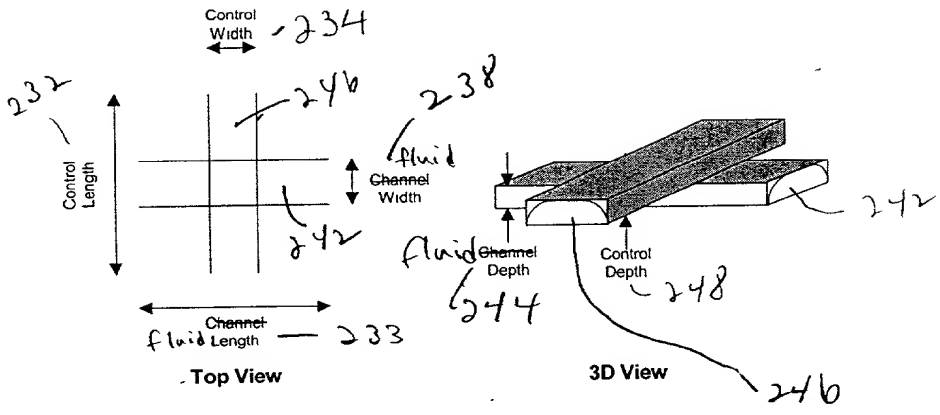


Fig 9a

Fig 9b

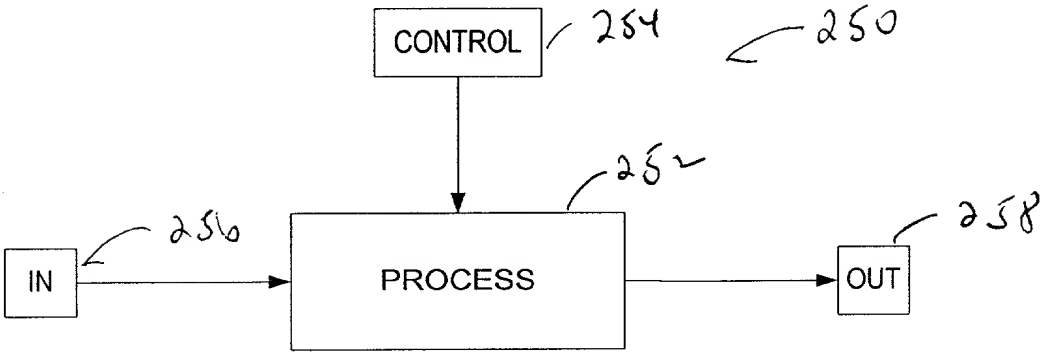

CONTROL
254
250
252
256
258
IN
PROCESS
OUT

Fig 10

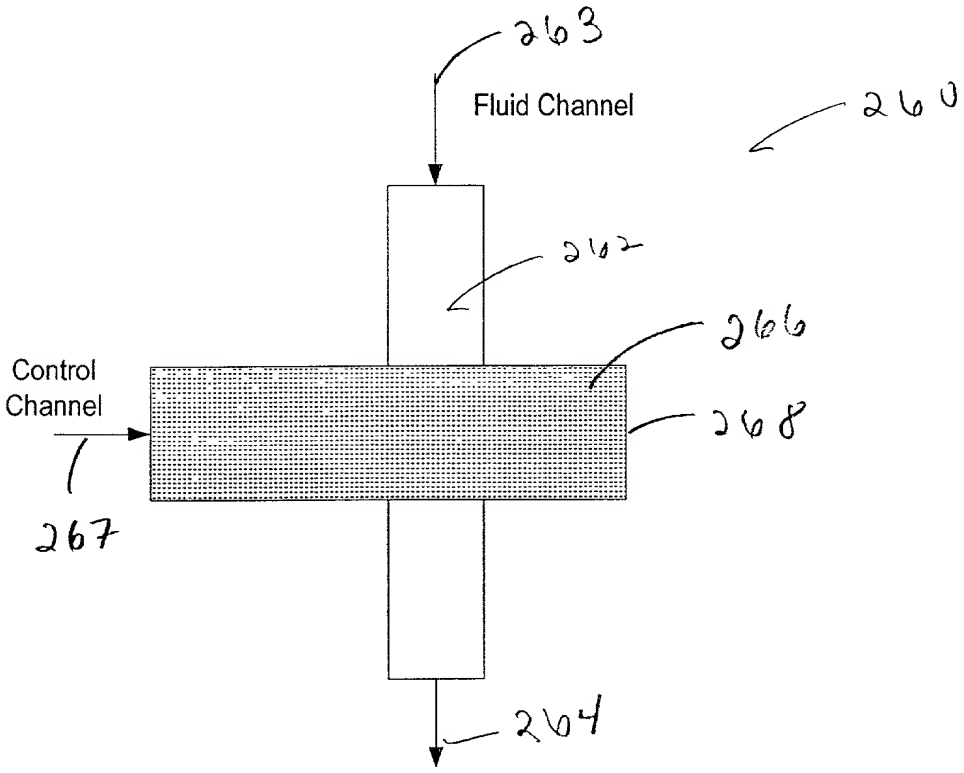

263
Fluid Channel
260
262
266
Control
Channel
268
267
264

Fig 11

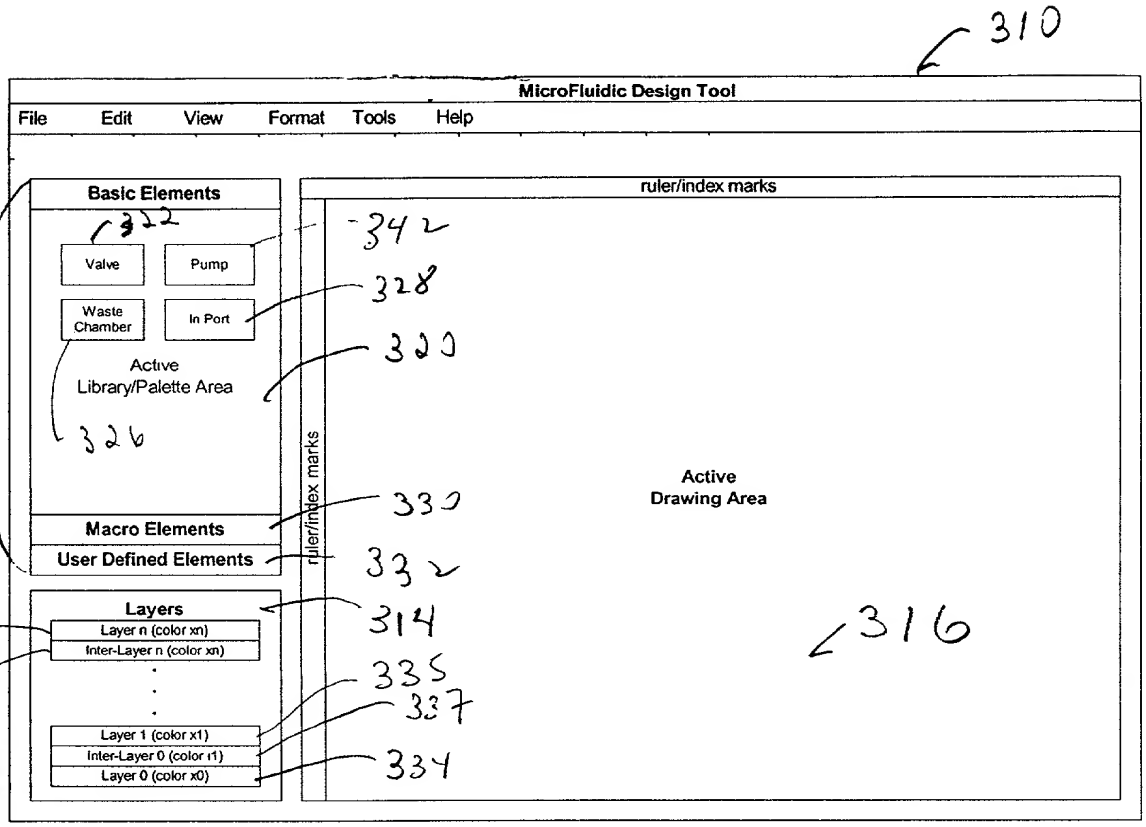

310
MicroFluidic Design Tool
File
Edit
View
Format
Tools
Help
Basic Elements
322
Valve
Pump
Waste Chamber
In Port
Active Library/Palette Area
326
Macro Elements
User Defined Elements
Layers
Layer n (color xn)
Inter-Layer n (color xn)
Layer 1 (color x1)
Inter-Layer 0 (color r1)
Layer 0 (color x0)
ruler/index marks
ruler/index marks
Active Drawing Area
316
342
328
320
330
332
314
335
337
334
338
336

Fig 12

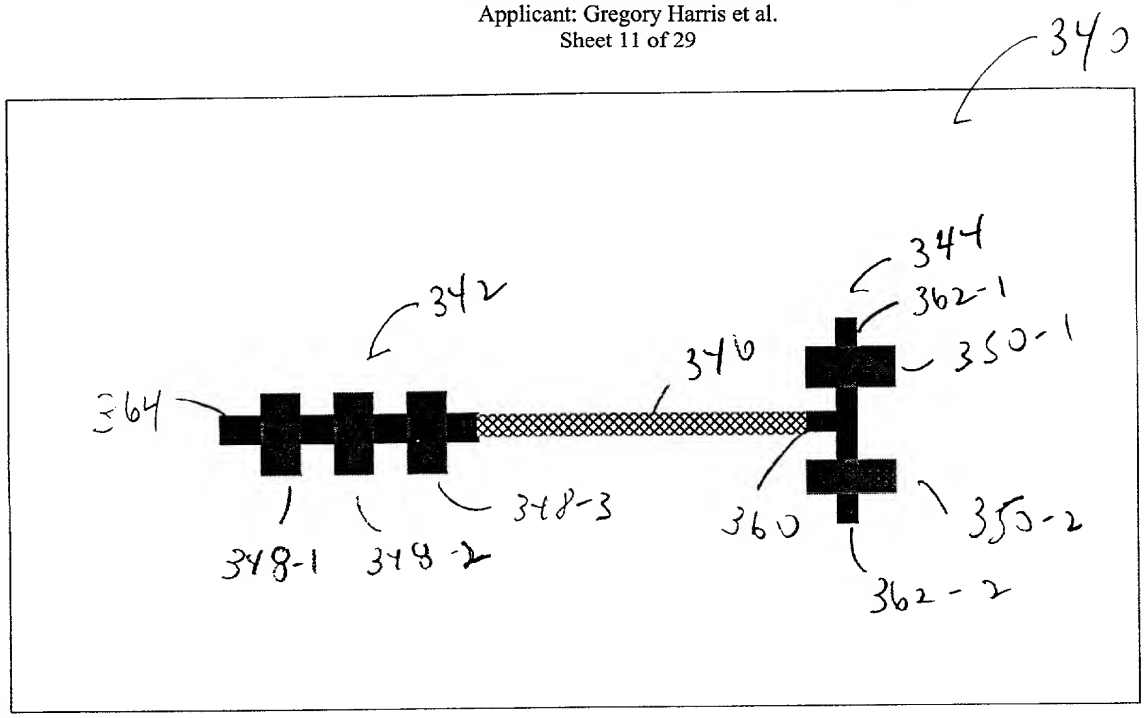


Fig 13A

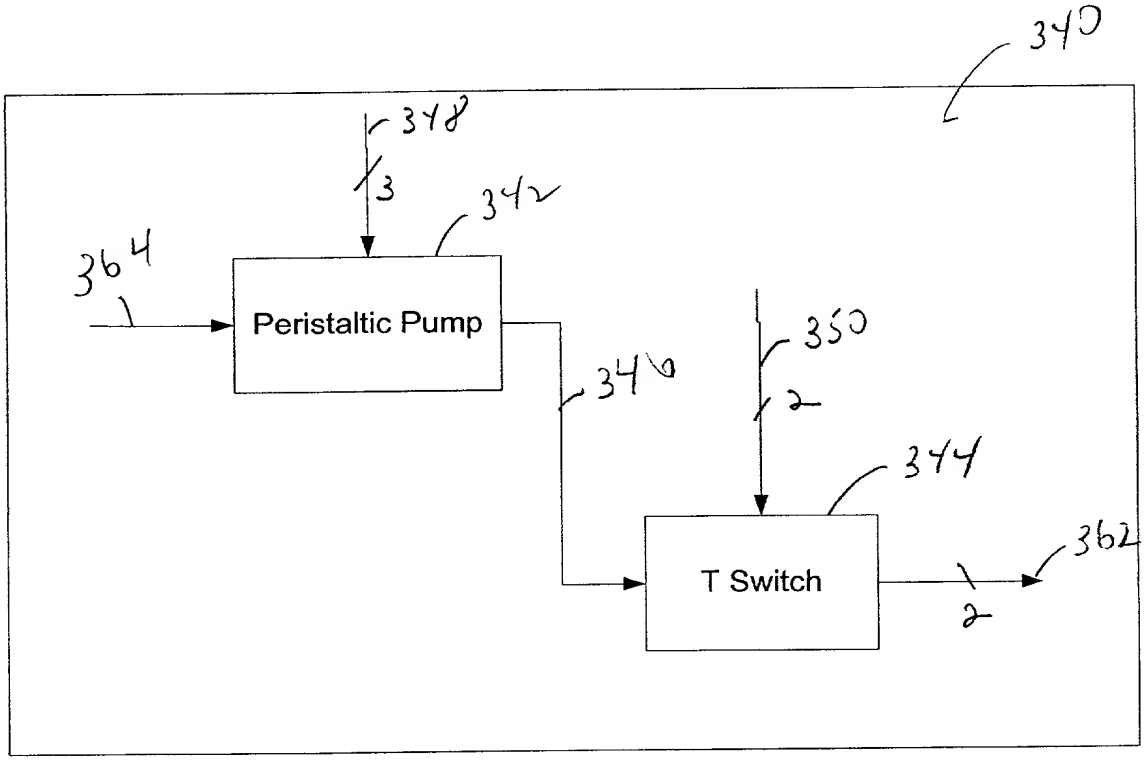


Fig 13B

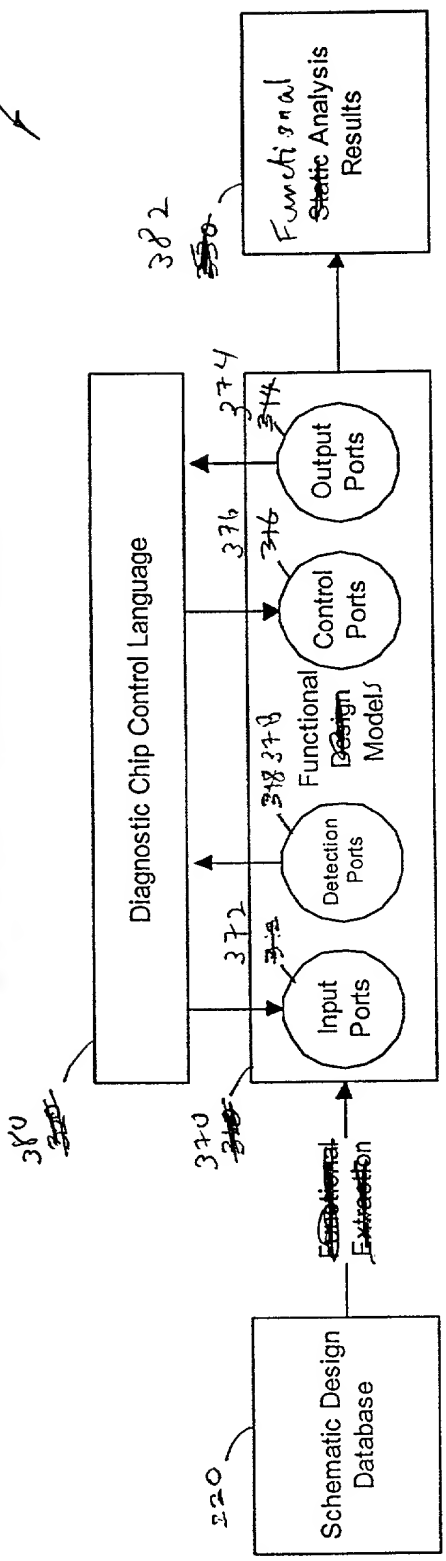

Schematic Design Database
Functional Extraction
Input Ports
Detection Ports
Functional Design Models
Control Ports
Output Ports
Diagnostic Chip Control Language
Functional Static Analysis Results

FIG. 1 / 4

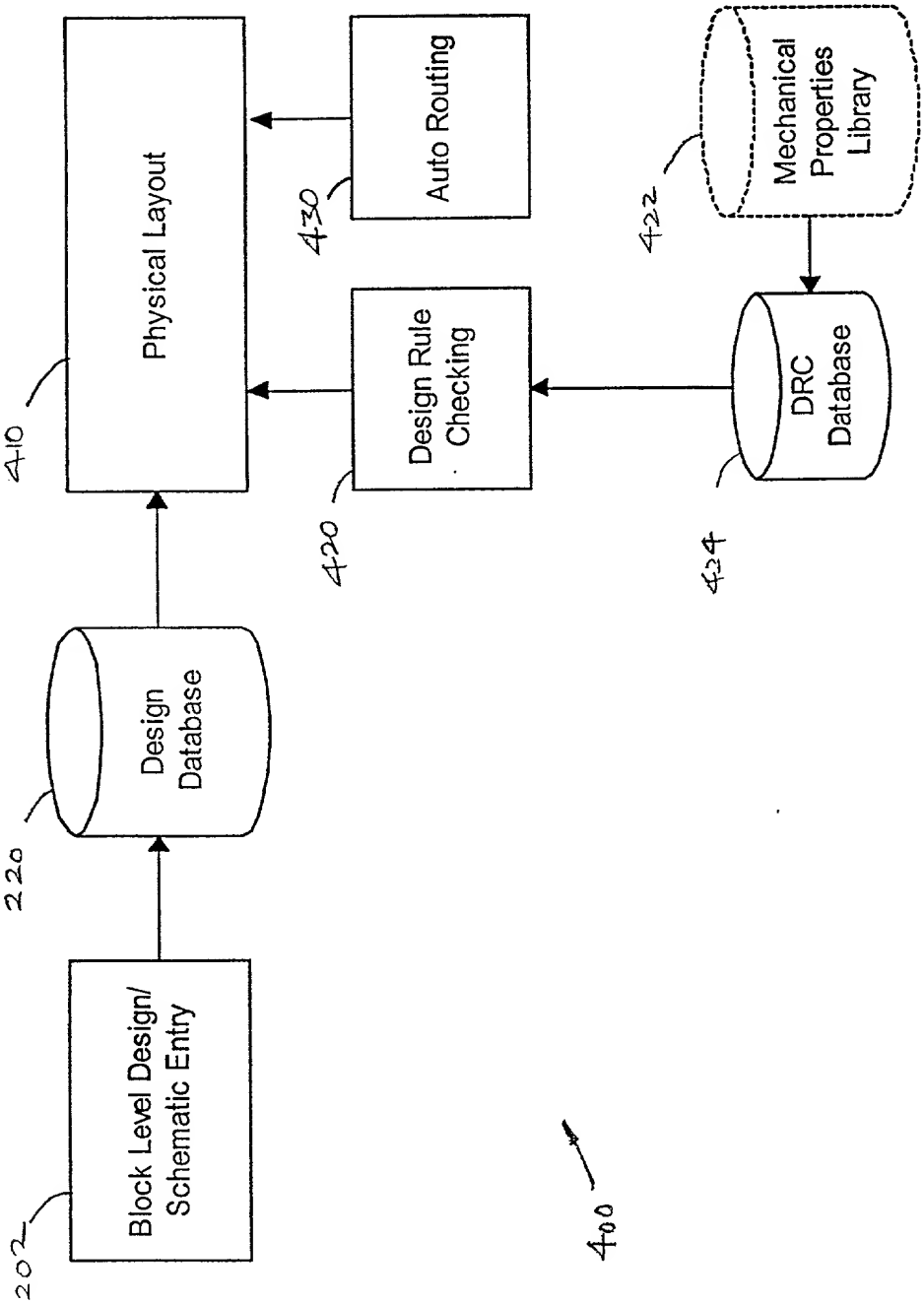

Block Level Design/ Schematic Entry
202
Design Database
220
Physical Layout
410
Design Rule Checking
420
Auto Routing
430
DRC Database
424
Mechanical Properties Library
422
400

FIG. 4

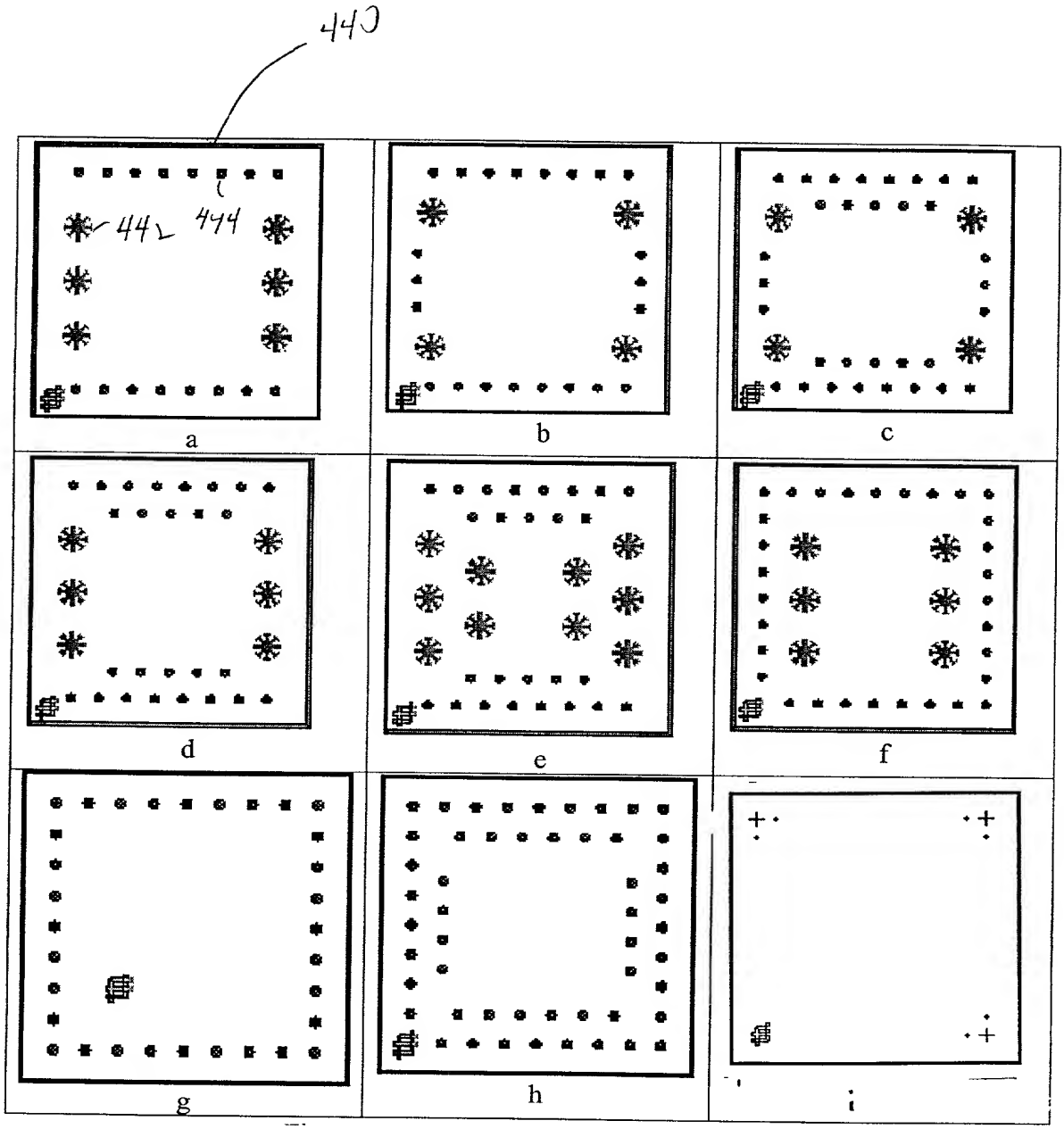
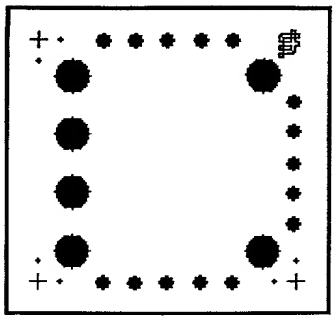
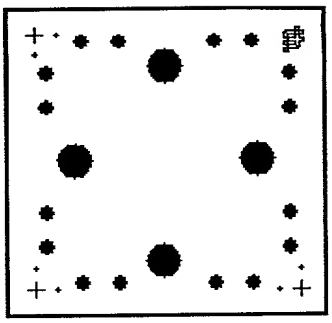


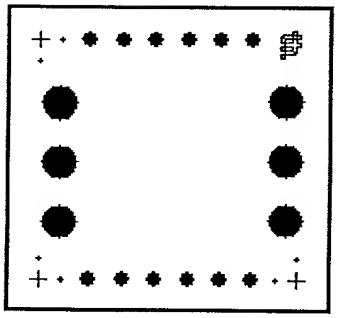
Fig 16A



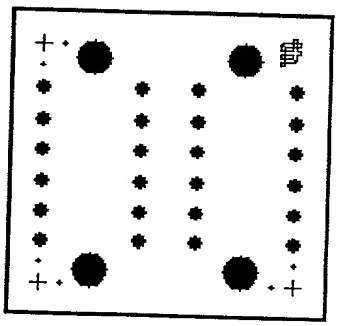
a



b



c



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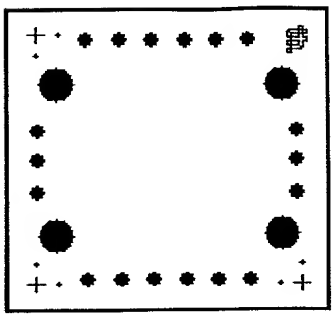
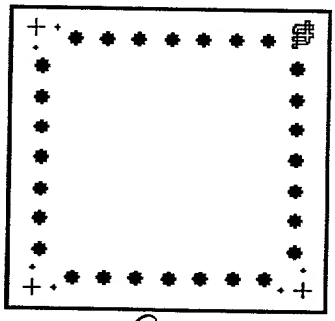


e



f

FIG. 16B

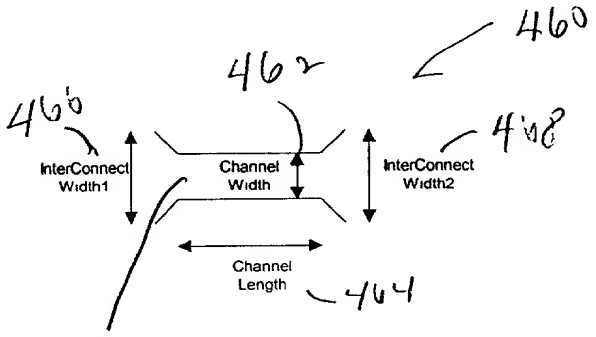


Fig 17A

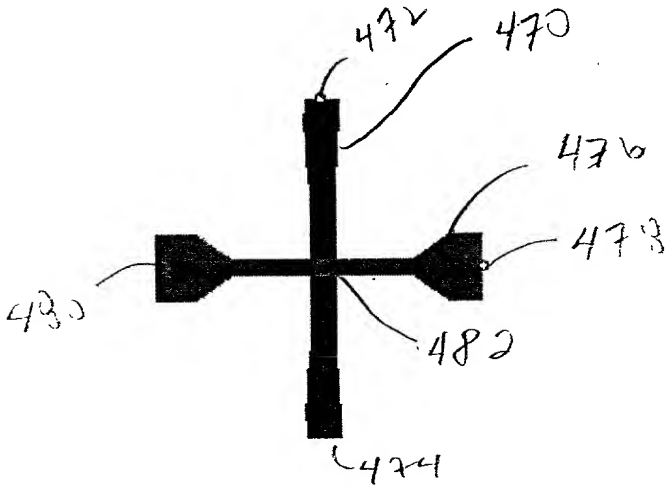


Fig 17B

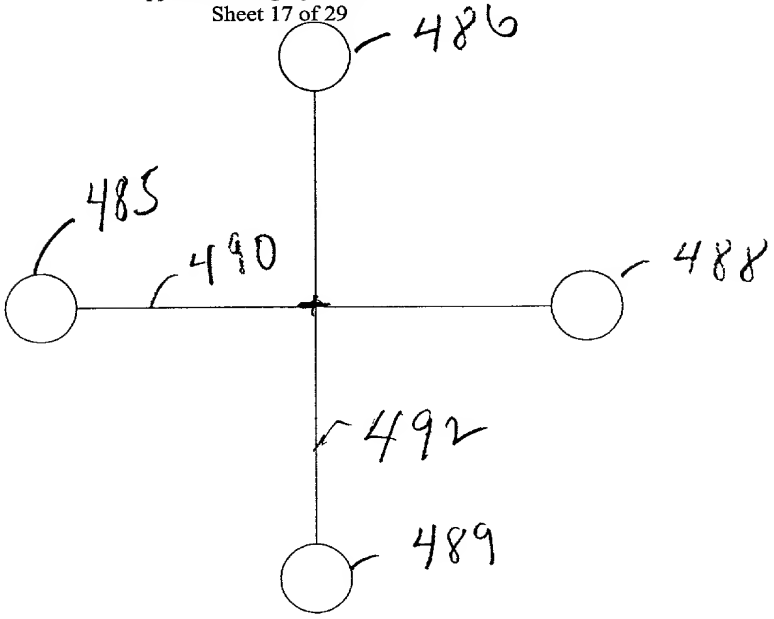


Fig 18A

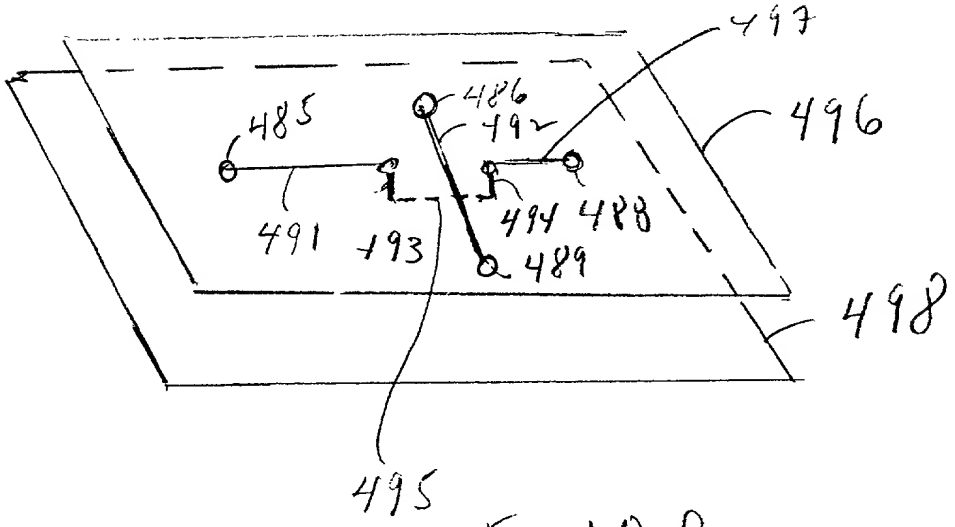


Fig 18B

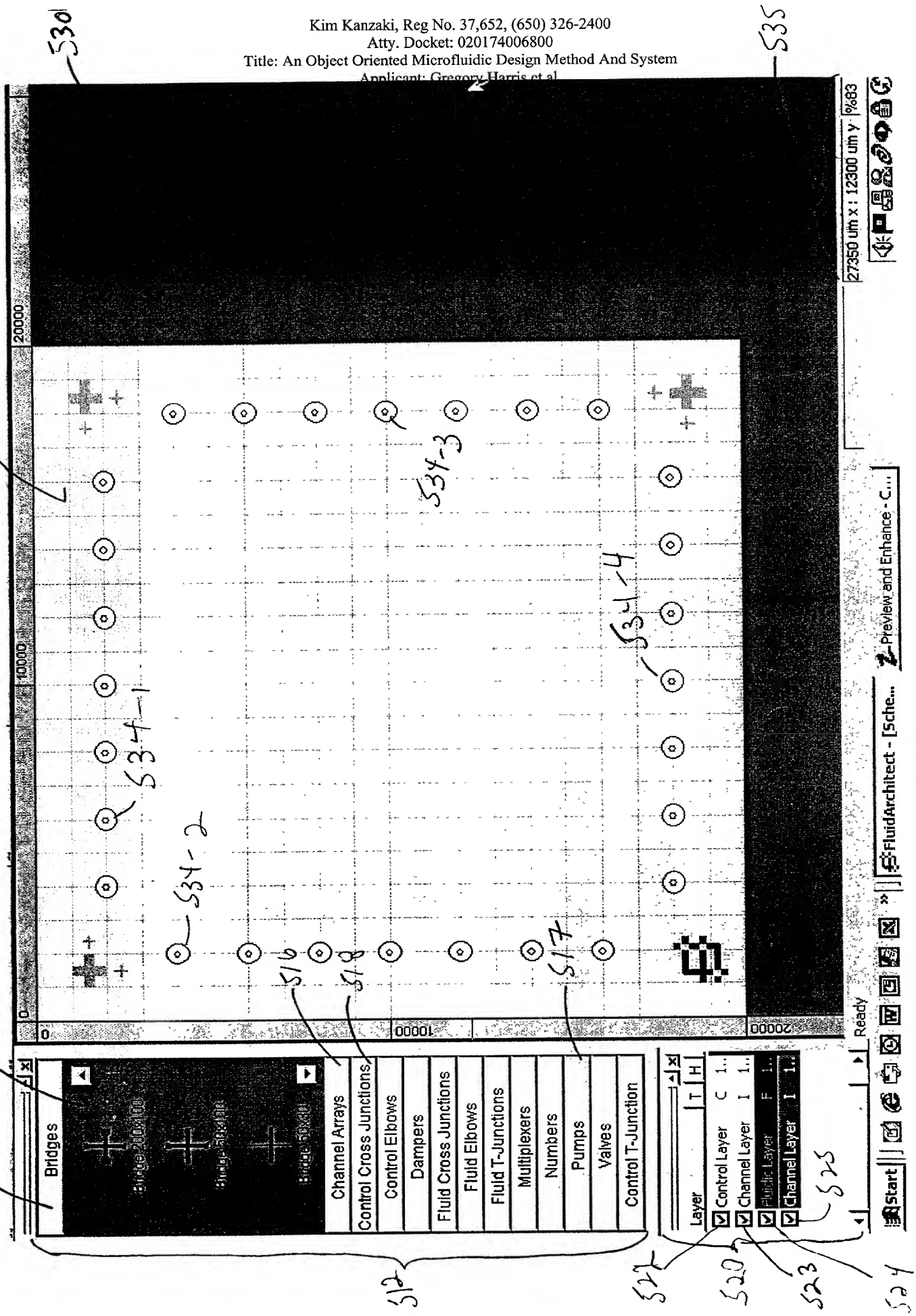

530
535
532
534-1
534-2
534-3
534-4
516
518
517
512
527
520
523
525
524
Bridges
Channel Arrays
Control Cross Junctions
Control Elbows
Dampers
Fluid Cross Junctions
Fluid Elbows
Fluid T-Junctions
Multiplexers
Numbers
Pumps
Valves
Control T-Junction
Layer
Control Layer
Channel Layer
Fluidic Layer
Channel Layer
Ready
FluidArchitect - [Sche...
Preview and Enhance - C...
27350 um x : 12300 um y
%83
Start

Fig 19

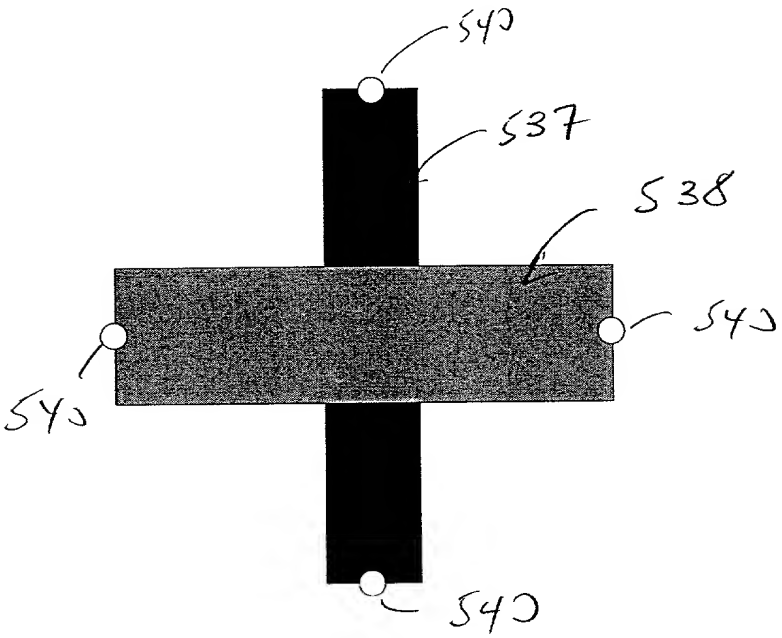


Fig 20

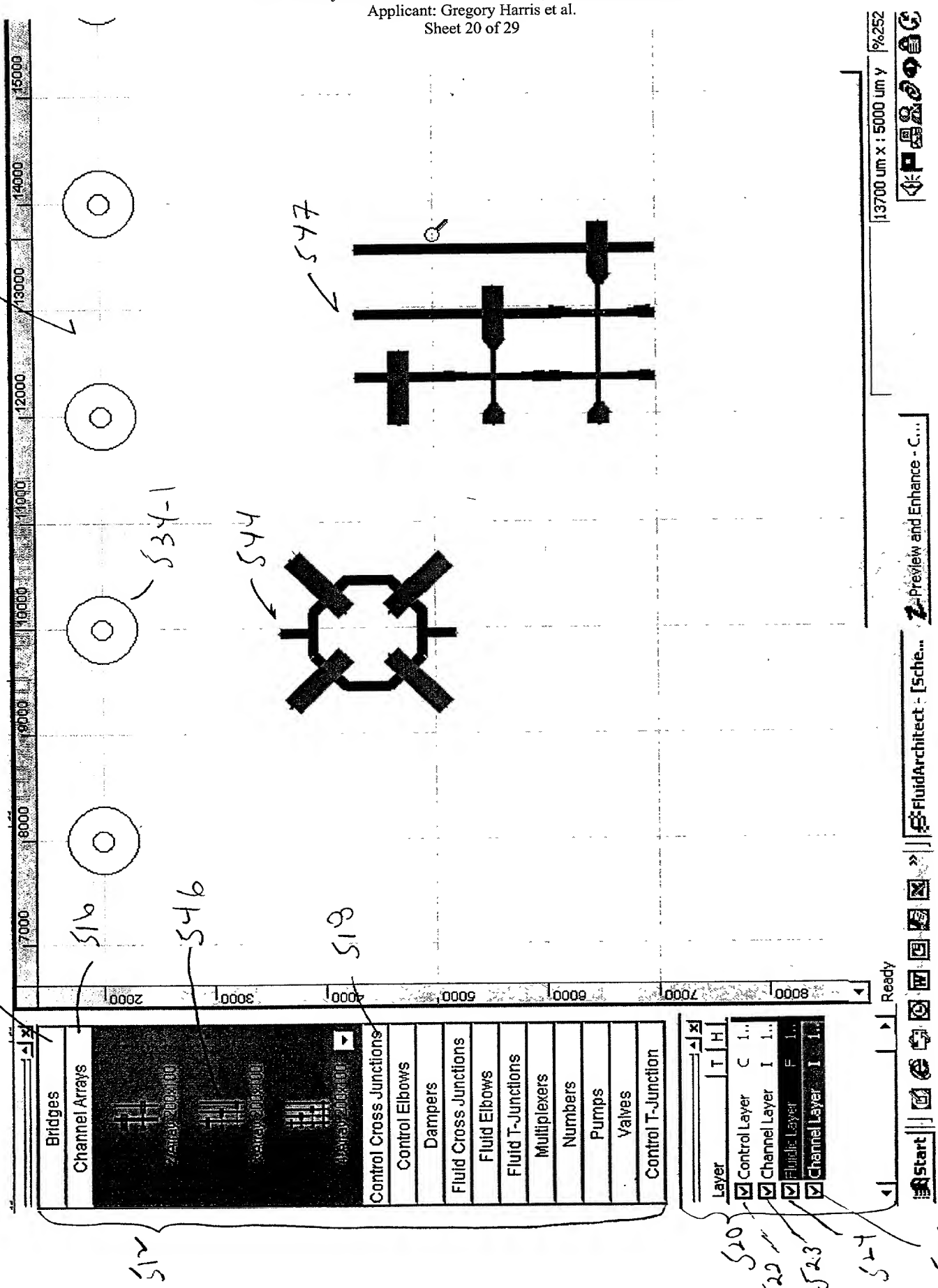

Bridges
Channel Arrays
Control Cross Junctions
Control Elbows
Dampers
Fluid Cross Junctions
Fluid Elbows
Fluid T-Junctions
Multiplexers
Numbers
Pumps
Valves
Control T-Junction
Layer
Control Layer
Channel Layer
Fluidic Layer
Channel Layer
Ready
FluidArchitect - [Sche...
Preview and Enhance - C...
13700 um x : 5000 um y
%252
Start
517
514
516
546
519
534-1
544
547
545
520
522
523
524
525

Fig 21

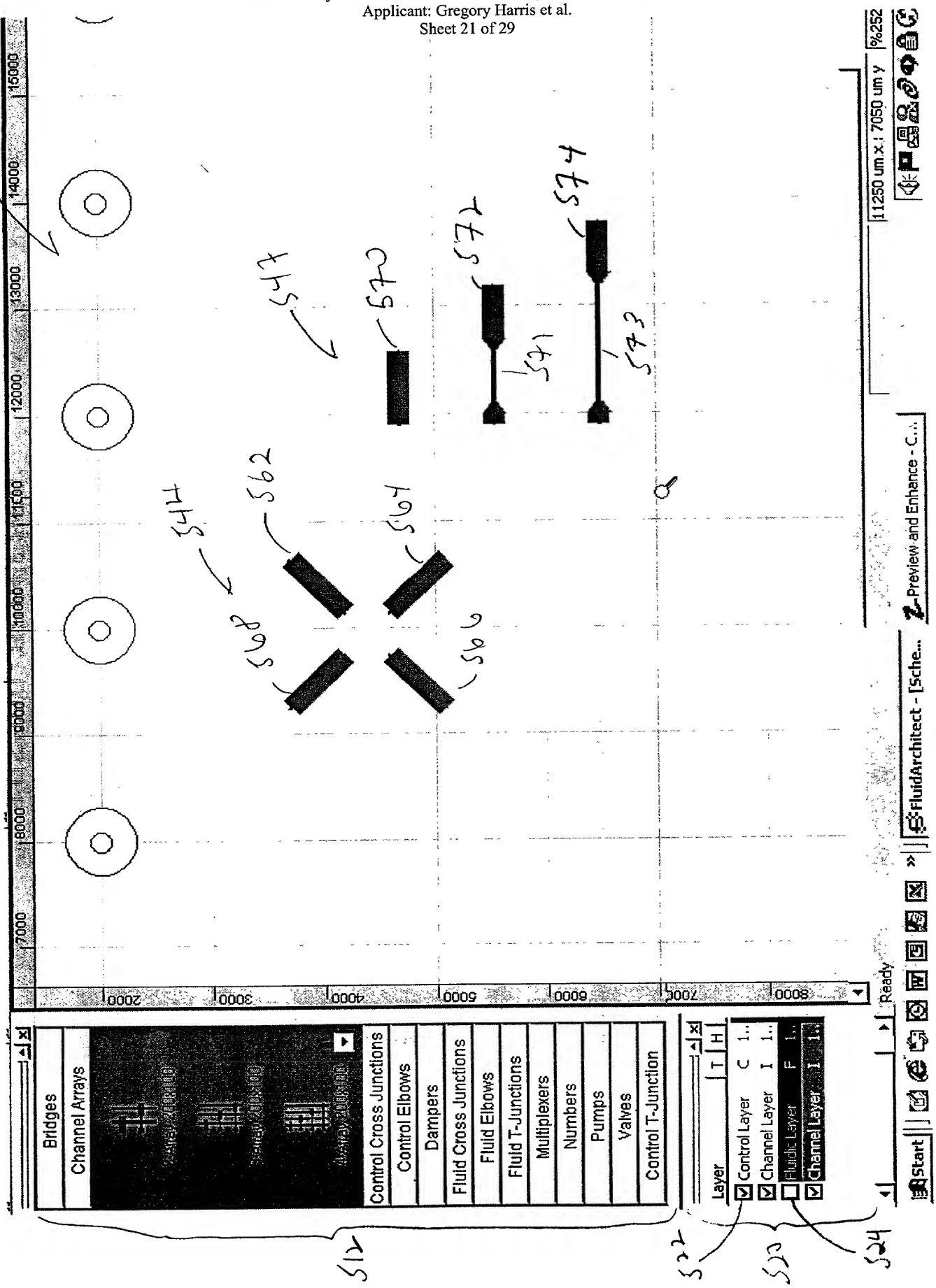

545
547
572
577
571
574
573
562
564
566
544
Bridges
Channel Arrays
Control Cross Junctions
Control Elbows
Dampers
Fluid Cross Junctions
Fluid Elbows
Fluid T-Junctions
Multiplexers
Numbers
Pumps
Valves
Control T-Junction
Layer
Control Layer
Channel Layer
Fluidic Layer
Channel Layer
Ready
FluidArchitect - [Sche...
Preview and Enhance - C...
11250 um x: 7050 um y
%252
Start
517
522
523
524

Fig 22

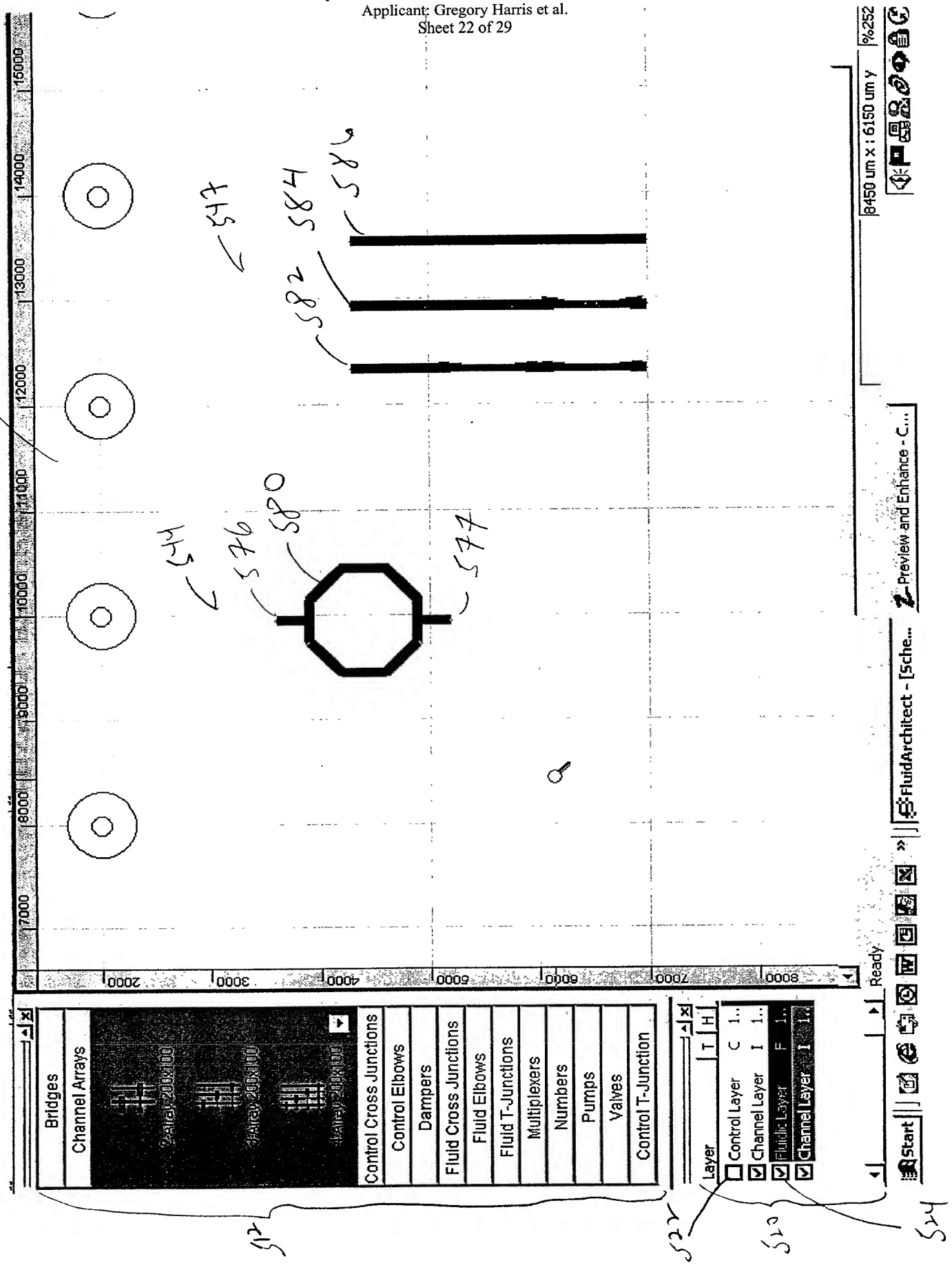

Bridges
Channel Arrays
Control Cross Junctions
Control Elbows
Dampers
Fluid Cross Junctions
Fluid Elbows
Fluid T-Junctions
Multiplexers
Numbers
Pumps
Valves
Control T-Junction
Layer
Control Layer
Channel Layer
Fluidic Layer
Channel Layer
Ready
FluidArchitect - [Sche...
Preview and Enhance - C...
8450 um x : 6150 um y
%252
Start
512
522
520
524
525
547
582
584
586
574
576
580
577

Fig 23

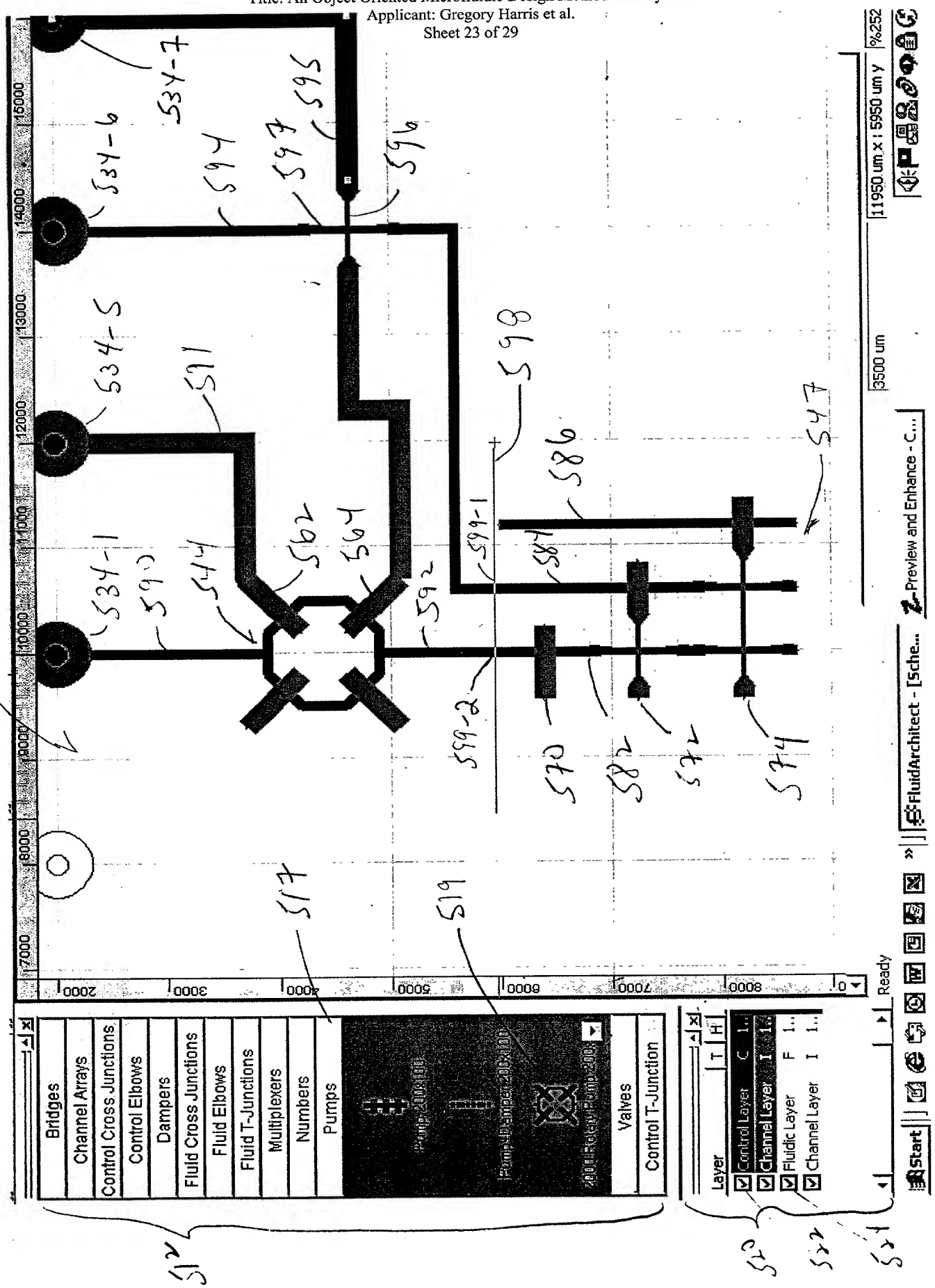

543
534-7
534-6
534-5
534-1
595
597
596
594
591
598
599-1
599-2
592
593
586
587
588
589
590
547
570
582
572
574
517
519
Bridges
Channel Arrays
Control Cross Junctions
Control Elbows
Dampers
Fluid Cross Junctions
Fluid Elbows
Fluid T-Junctions
Multiplexers
Numbers
Pumps
Valves
Control T-Junction
Layer
Control Layer
Channel Layer
Fluidic Layer
Channel Layer
FluidArchitect - [Sche...
Preview and Enhance - C...
Start
Ready
3500 um
11950 um x : 5950 um y
%252
517
519
520
522
524

Fig 24

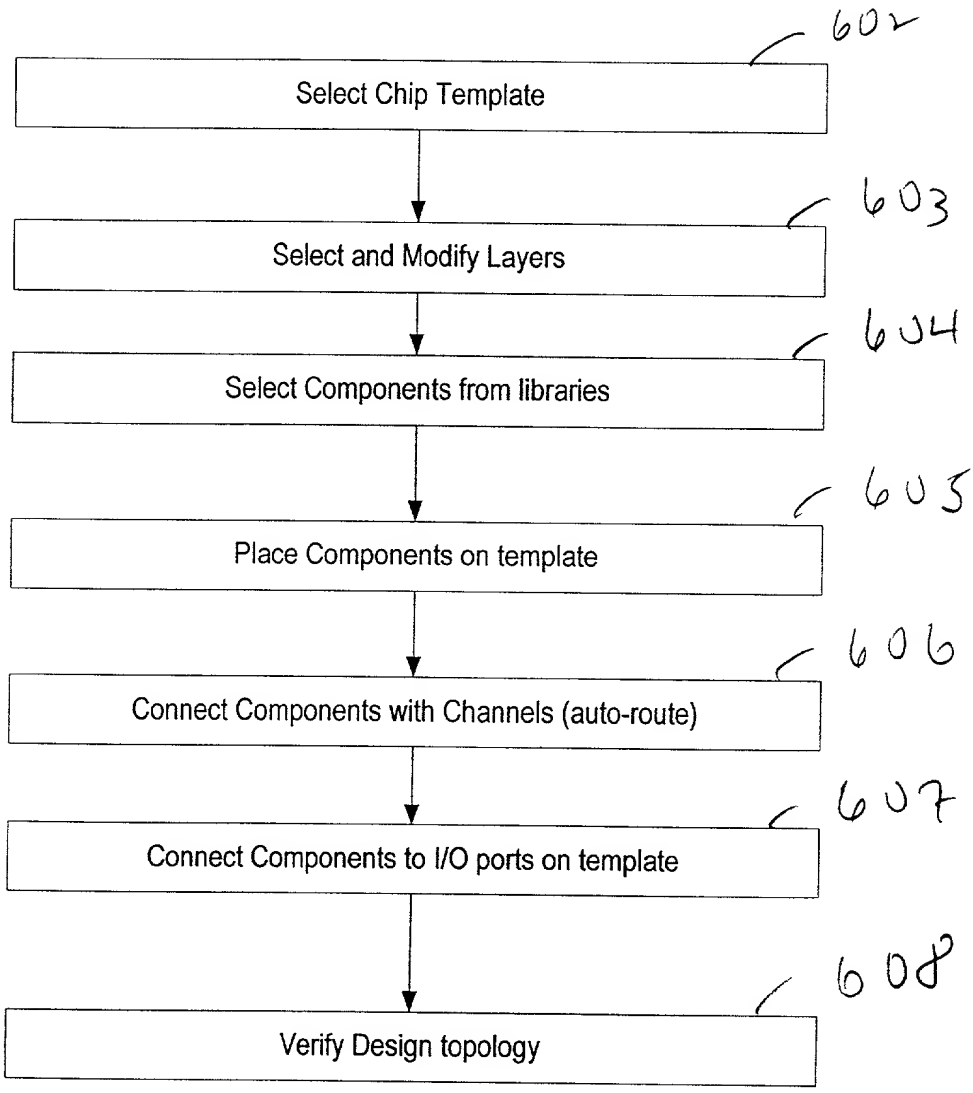

602
Select Chip Template
603
Select and Modify Layers
604
Select Components from libraries
605
Place Components on template
606
Connect Components with Channels (auto-route)
607
Connect Components to I/O ports on template
608
Verify Design topology

Fig 25

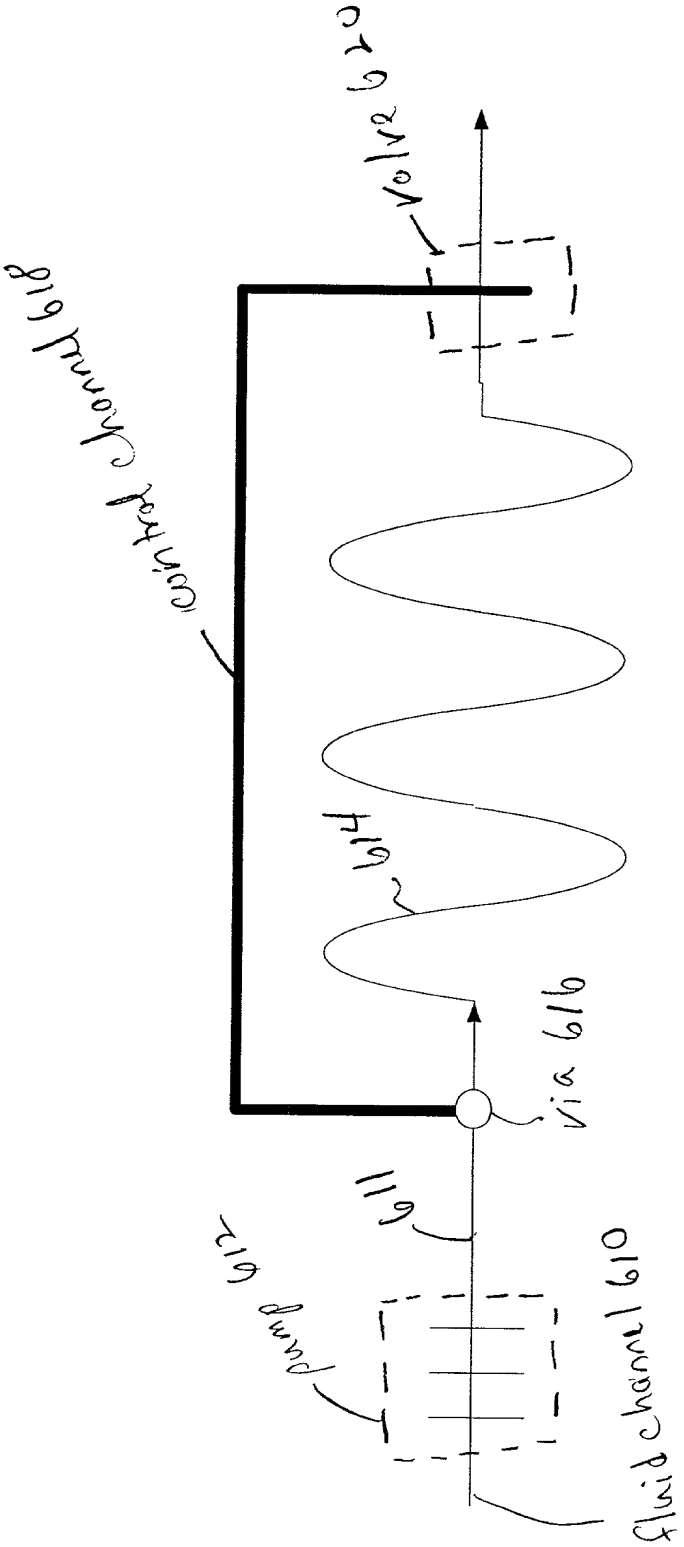


Fig 26.

Express Mail Label No. EV 339 525 245 US

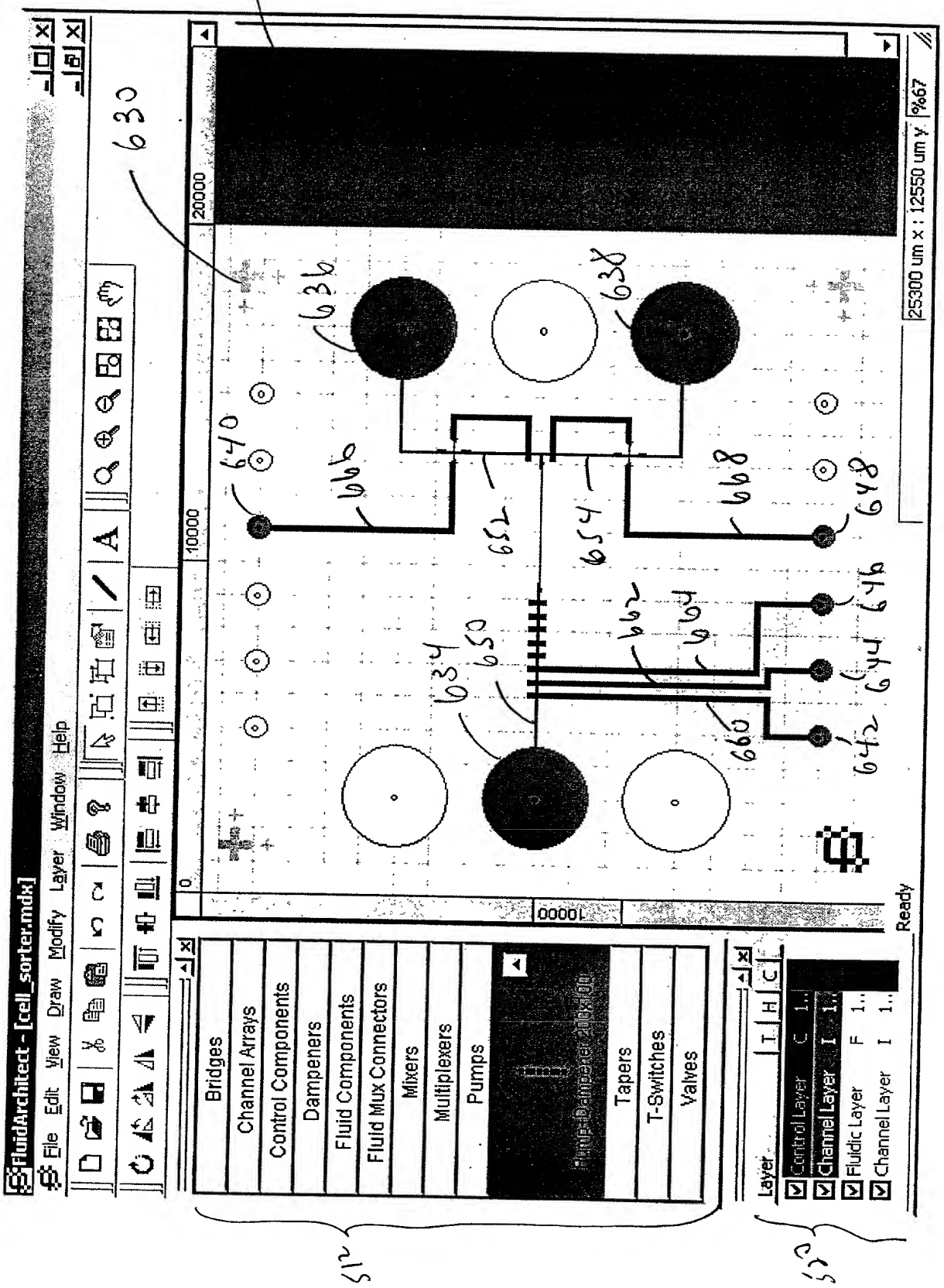

FluidArchitect - [cell_sorter.mdk]
File Edit View Draw Modify Layer Window Help
Bridges
Channel Arrays
Control Components
Dampeners
Fluid Components
Fluid Mux Connectors
Mixers
Multiplexers
Pumps
Tapers
T-Switches
Valves
Layer
Control Layer
Channel Layer
Fluidic Layer
Channel Layer
Ready
25300 um x : 12550 um y
%67
630
634
636
638
640
642
644
646
648
650
652
654
660
662
664
666
668
512
520
530

Fig 27

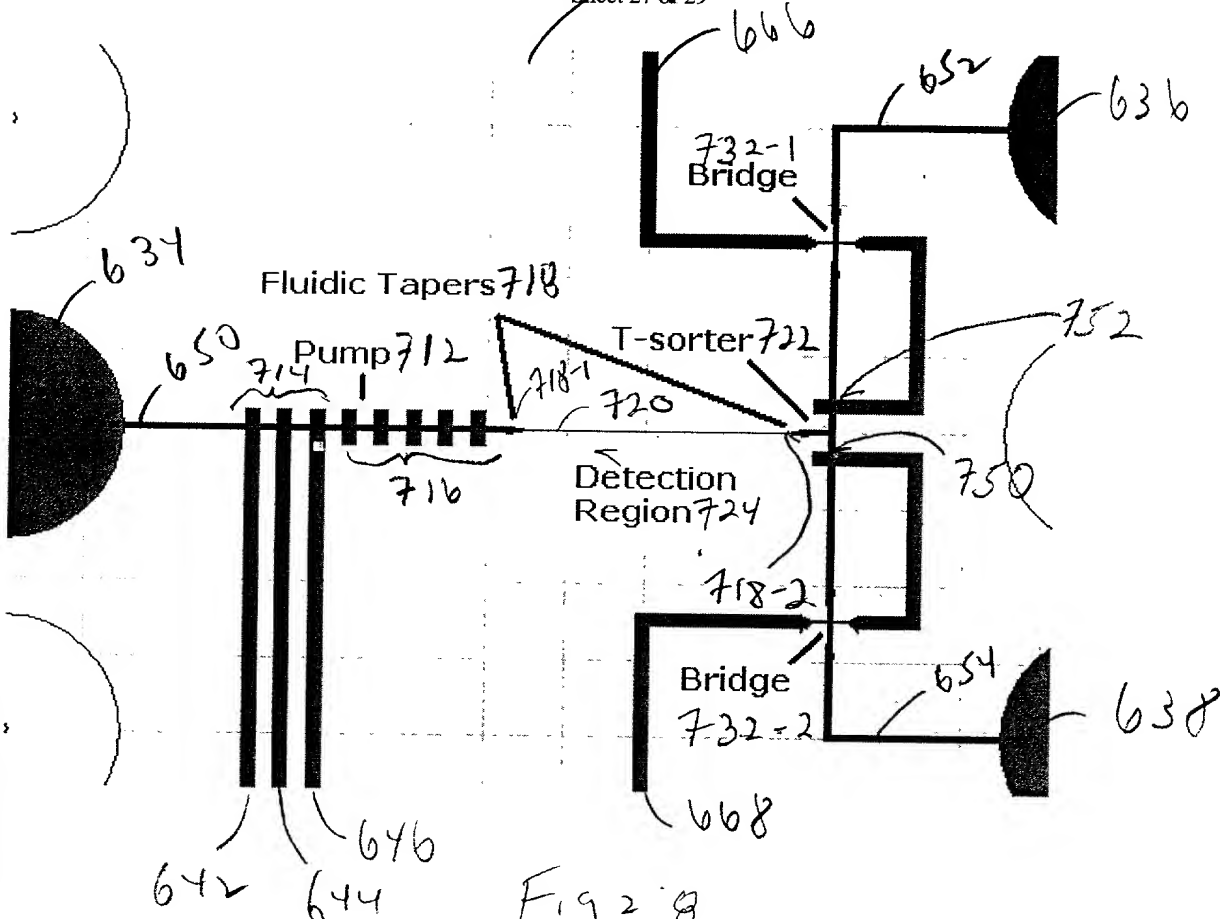


Fig 2 8

FP2550-8526-00

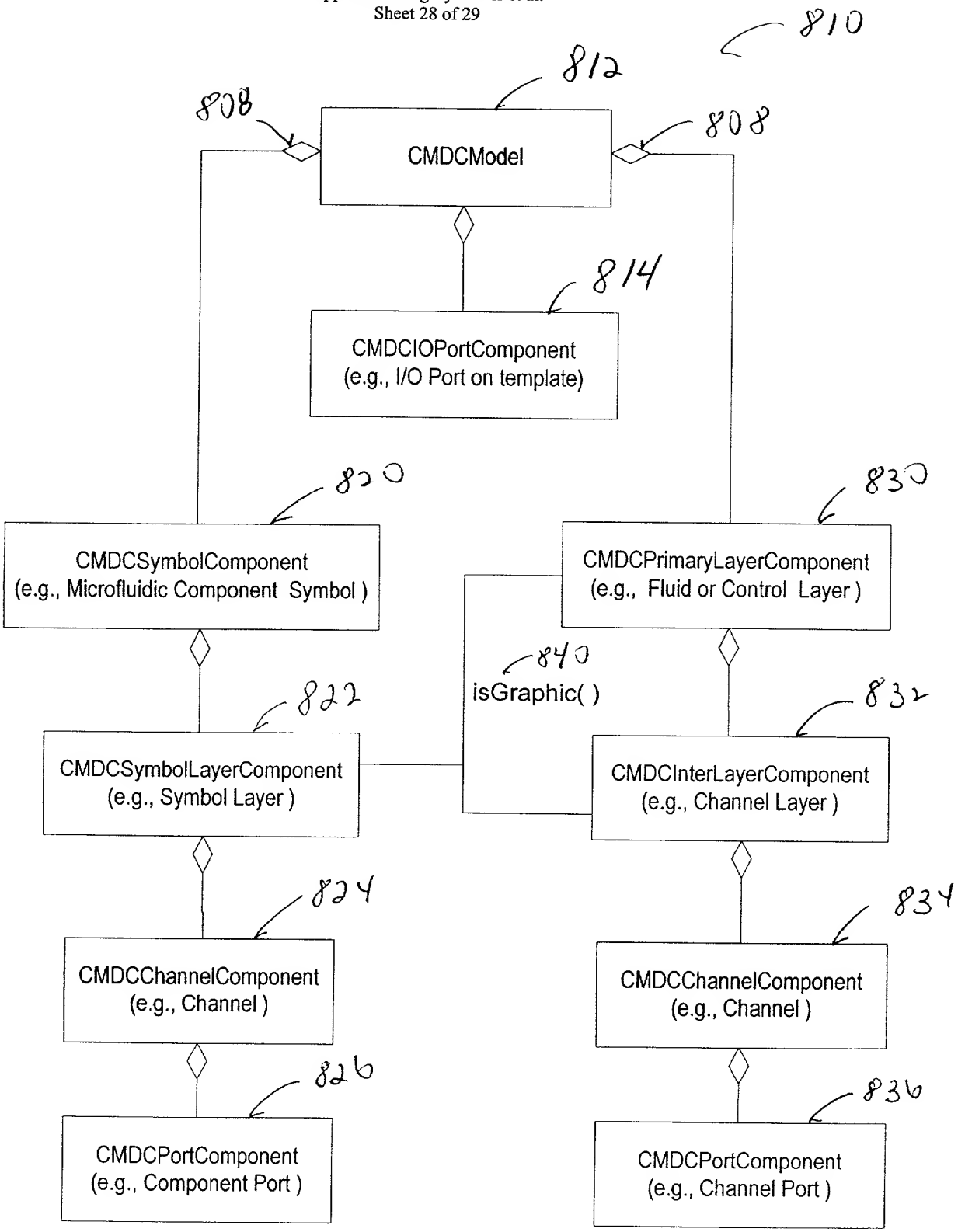

810
812
808
808
CMDCModel
814
CMDCIOPortComponent
(e.g., I/O Port on template)
820
830
CMDCSymbolComponent
(e.g., Microfluidic Component Symbol)
CMDCPrimaryLayerComponent
(e.g., Fluid or Control Layer)
840
isGraphic( )
822
832
CMDCSymbolLayerComponent
(e.g., Symbol Layer)
CMDCInterLayerComponent
(e.g., Channel Layer)
824
834
CMDCChannelComponent
(e.g., Channel)
CMDCChannelComponent
(e.g., Channel)
826
836
CMDCPortComponent
(e.g., Component Port)
CMDCPortComponent
(e.g., Channel Port)

Fig 28-1

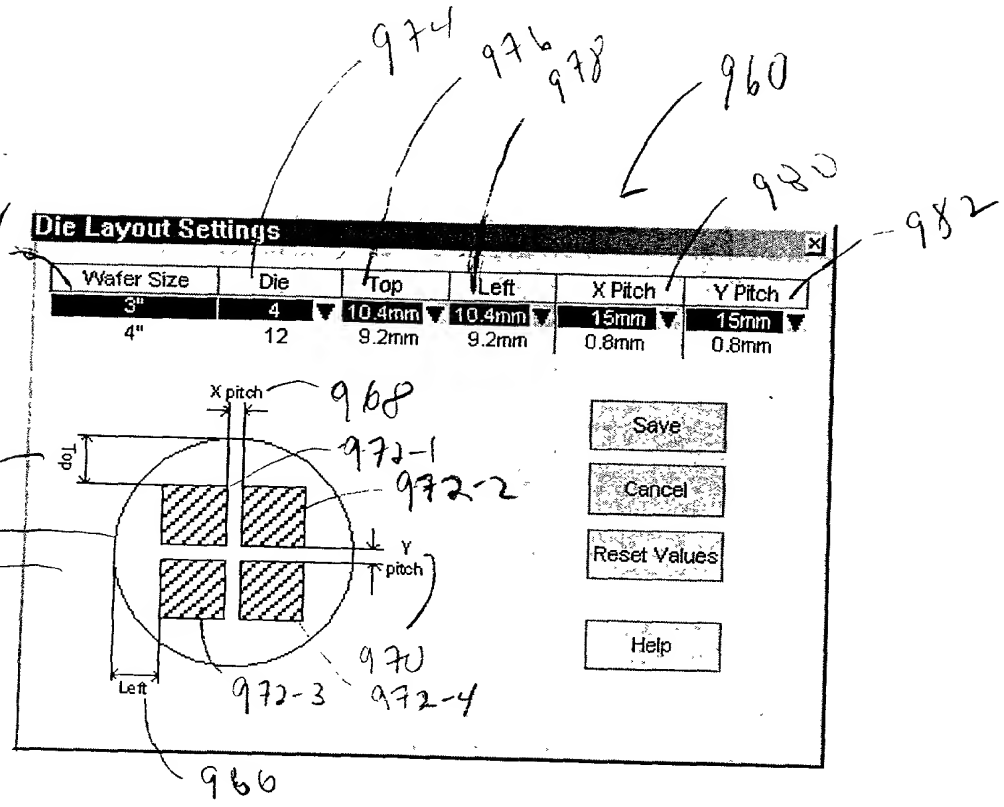

974
976
978
960
980
982
Die Layout Settings
Wafer Size
Die
Top
Left
X Pitch
Y Pitch
3"
4
10.4mm
10.4mm
15mm
15mm
4"
12
9.2mm
9.2mm
0.8mm
0.8mm
X pitch
968
Top
964
972-1
972-2
963
Y pitch
962
970
Left
972-3
972-4
966
Save
Cancel
Reset Values
Help

Fig 29.